Part 2.3

a.)

Use the experimental Bode plot to find (approximate) the two break point frequencies. Recall that a model of the LVDT (homework 4) yielded the following transfer function.

Break1=308.3 Hz

Break2=47485 Hz







b)Using the break frequencies from a) and the above transfer function, find the inductances Lp and L0. Use the spec sheet for the E-500 LVDT for resistance values. Assume the measurement resistance is a mega ohm. What is the usable bandwidth of the LVDT based on your experimental Bode plot?

Usable bandwidth is between the break frequencies, 308 Hz – 47.5 kHz

c) For the flat (usable) portion of the Bode plot, what is the theoretical sensitivity of the LVDT (give a symbolic expression)? Using this expression and your experimental Bode plot, assuming that x=0.1 in, find the gain term Km.

d)Use Matlab to make a theoretical Bode plot of Eo(jω)/Ei (jω) using the transfer function derived from the homework problem, and the values of Lp, L0, and Km found in parts b) and c). Assume x=0.1 in.



Theoretical Bode Diagram

e) Compare the experimental and theoretical frequency responses.

The theoretical bode plot seems like it has a usable bandwidth that reaches a higher range than the experimental. The sensitivity for both is about the same

f) Filtering can cause problems in accuracy of the output signal when the core is moving. Why or why not?

The core also has a resonant frequency that can add noise to the output signal. This resonant frequency can be an issue while the core is moving or force is applied to it.

g) Discuss the effect of lowering the excitation frequency to the LVDT. Use the Bode plots to draw conclusions.

Lowering input frequency will increase the sensitivity of the system at the usable bandwidth.